

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re United States Patent Application of:)	Docket No.: 020732-97.668 (7493)
Applicants: RATH, Melissa K., et al.)	Conf. No.: 4823
Application No.: 10/792,038)	Art Unit: 1752
Date Filed: March 3, 2004)	Examiner: LE, Hoa Van
Title: COMPOSITION AND PROCESS FOR POST-ETCH REMOVAL OF PHOTORESIST AND/OR SACRIFICIAL ANTI-REFLECTIVE MATERIAL DEPOSITED ON A SUBSTRATE)	Customer No.: 24239

BRIEF ON APPEAL IN U.S. PATENT APPLICATION NO. 10/792,038

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P-0. Box 1450
Alexandria, VA 22313-1450

Sir:

This Brief is submitted on appeal under 35 USC §134 from the Final Rejection in the Office Action dated February 24, 2009, of claims 1, 2, 4-5, 10, 15, 19-20 and 56 of U.S. Patent Application No. 10/792,038. A Notice of Appeal was filed June 29, 2009. Applicants are submitting this Appeal Brief on August 31, 2009. The appeal brief fee of \$540.00 for large entity is being submitted electronically herewith.

Authorization also is hereby given, to charge any additional fee or amount properly payable in connection with the filing of this Appeal Brief, to Deposit Account No. 13-4365 of Moore & Van Allen.

No oral hearing is requested.

TABLE OF CONTENTS

A.	Real Party in Interest	3
B.	Related Appeals and Interferences	3
C.	Status of Claims	3
D.	Status of Amendment	4
E.	Summary of Claimed Subject Matter	4
F.	Grounds of Rejection to Be Reviewed on Appeal	5
G.	Argument	6
H.	Claims Appendix	14
I.	Related Proceedings Appendix	27

REAL PARTY IN INTEREST

The real party in interest in this appeal is Advanced Technology Materials, Inc., the owner of the invention and patent rights of this application, by virtue of an Assignment recorded in the assignment records of the U.S. Patent and Trademark Office at reel/frame 015048/0298 on March 3, 2004.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to applicants, the applicants' legal representative or assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 1, 2, 4-6, 10, 15, 17-21, 53, 56 and 57 are pending in the subject application; and claims 1, 2, 4-6, 10, 15, 17-21, 53 and 56 are rejected while claim 57 has been objected to as being dependent upon a rejected base claim, and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 3, 8, 9, 11-13, 16, 22, 23, 32, 36-38, 40-42, 51, and 52 were previously cancelled and claims 7, 14, 24-31, 33-35, 39, 43-50, 54-55 and 58-59 were previously withdrawn.

In the February 24, 2009 Final Office Action, the following rejection was made:

1. Claims 1-2, 4-5, 10, 15, 19-20 and 56 were rejected under 35 U.S.C. §103(a) as being unpatentable over Koito et al. (U.S. Patent Application Publication No. 20030130147) in view of En et al. (U.S. Patent Application Publication No. 20040134682) and Sato et al. (U.S. Patent No. 5,849,467).

In addition, claims 1, 4-6, 10, 15, 17-21, 53 and 56 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting. Due to the nature of the provisional rejection, the claims that were only rejected provisionally will not be discussed herein.

Thus, the rejections of record that constitute the subject of this Appeal are the 35 U.S.C. §103 (a) rejections of claims 1-2, 4-5, 10, 15, 19-20 and 56. A complete listing of the provisionally allowed claim 57 and appealed claims 1-2, 4-5, 10, 15, 19-20 and 56 is provided in the Claims Appendix enclosed herewith.

STATUS OF AMENDMENT

An amendment was filed on April 24, 2009 in response to the February 24, 2009 Final Office Action finally rejecting claims 1-2, 4-5, 10, 15, 19-20 and 56 appealed herein and the amendment was entered. No amendment to the claims was made after receipt of the Final Office Action of February 24, 2009. For purposes of discussing the rejections of the claims under 35 U.S.C. §103(a), claims 1-2, 4-5, 10, 15, 19-20 and 56 in the Claims Appendix are the same in substance to the form of claims 1-2, 4-5, 10, 15, 19-20 and 56 to which the February 24, 2009 Final Office Action was directed.

SUMMARY OF CLAIMED SUBJECT MATTER

In the following paragraph, a concise explanation of the subject matter defined in representative claim 1 is set forth below, with reference to the specification of U.S. Patent Application No. 10/792,038 by page and paragraph numbers, the subject of the present appeal.

<p>Claim 1</p> <p>A cleaning composition comprising</p> <p>a quaternary base,</p> <p>at least one alkali or alkaline earth base, and</p> <p>at least one additional component selected from the group consisting of a chelator, an oxirane species, and combinations thereof,</p> <p>wherein said chelator comprises a species selected from the group consisting of: 1-amino-1,2,4-triazole; 1-amino-1,2,3-triazole; 1-amino-5-methyl-1,2,3-triazole; 3-mercapto-1,2,4-triazole; 3-isopropyl-1,2,4-triazole; naphthotriazole; 2-mercaptobenzimidazole; 5-aminotetrazole; 5-amino-1,3,4-thiadiazole-2-</p>	<p>paragraph [0024]</p> <p>paragraph [0024]</p> <p>paragraph [0024] and formulations E, F, G</p> <p>paragraph [0031]</p>
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<p>thiol; 2,4-diamino-6-methyl-1,3,5-triazine; triazine; methyltetrazole; 1,5-pentamethylenetetrazole; 1-phenyl-5-mercaptotetrazole; diaminomethyltriazine; imidazoline thione; 4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-thiol; tritoyl phosphate; indiazole; adenine; salicylamide; iminodiacetic acid; benzoguanamine; thiocyanuric acid; anthranilic acid; 3-mercaptopropanol; and combinations thereof, and</p> <p>wherein the oxirane species comprises a species selected from the group consisting of: oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol) (2:1), N-(3(C9-11-isoalkyloxy)propyl)derivatives, C₁₀-rich; and oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether.</p>	<p>formulations E, F, G</p>
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GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are to be reviewed in this appeal:

- Whether claims 1-2, 4-5, 10, 15, 19-20 and 56 are unpatentable under 35 U.S.C. §103(a) over Koito et al. (U.S. Patent Application Publication No. 20030130147) in view of En et al. (U.S. Patent Application Publication No. 20040134682) and Sato et al. (U.S. Patent No. 5,849,467).

ARGUMENT

1. Whether claims 1-2, 4-5, 10, 15, 19-20 and 56 are unpatentable under 35 U.S.C. §103(a) over Koito et al. (U.S. Patent Application Publication No. 20030130147) (hereinafter Koito) in view of En et al. (U.S. Patent Application Publication No. 20040134682) (hereinafter En) and Sato et al. (U.S. Patent No. 5,849,467) (hereinafter Sato). Representative claims of the group include claim 1.

Claim 1

Applicants' claim 1 recites the following:

A cleaning composition comprising

a quaternary base,
at least one alkali or alkaline earth base, and
at least one additional component selected from the group
consisting of a chelator, an oxirane species, and combinations
thereof,

wherein said chelator comprises a species selected from the
group consisting of: 1-amino-1,2,4-triazole; 1-amino-1,2,3-
triazole; 1-amino-5-methyl-1,2,3-triazole; 3-mercapto-1,2,4-
triazole; 3-isopropyl-1,2,4-triazole; naphthotriazole; 2-
mercaptobenzimidazole; 5-aminotetrazole; 5-amino-1,3,4-
thiadiazole-2-thiol; 2,4-diamino-6-methyl-1,3,5-triazine;
triazine; methyltetrazole; 1,5-pentamethylenetetrazole; 1-phenyl-
5-mercaptotetrazole; diaminomethyltriazine; imidazoline thione;
4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-
thiol; tritoyl phosphate; indiazole; adenine; salicylamide;
iminodiacetic acid; benzoguanamine; thiocyanuric acid;
anthranilic acid; 3-mercaptopropanol; and combinations thereof,
and

wherein the oxirane species comprises a species selected from
the group consisting of: oxirane, methyl-, polymer with oxirane,
ether with 2,2'-(oxidoimino)bis(ethanol) (2:1), N-(3(C9-11-
isoalkyloxy)propyl)derivatives, C₁₀-rich; and oxirane, methyl-,
polymer with oxirane, mono(octylphenyl)ether.

According to the Examiner, Koito discloses, teaches and suggests a cleaning composition comprising a quaternary base and adenine for the removal of unwanted material. The Examiner

further stated that Koito does not specify the inclusion of an alkali base but “it is known in the art at the time the invention was made to obtain and use an alkali base for the advantage of providing a sufficient alkalinity and stripping power,” as evidenced by En and Sato. As such, according to the Examiner:

“[s]ince the above references are all related to cleaners, removers and/or strippers, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use or cite potassium hydroxide alkaline agent for a reasonable expectation of sufficiently providing an additional alkalinity and stripping power to one having ordinary skill in the art.” (emphasis added)

It is well established in the law that if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Under Graham, and as required by MPEP §§2111 and 2141.02, the Examiner must ascertain the differences between the claimed invention and the prior art, and must consider both the invention and the prior art as a whole. Thus, certain individual features from the references may not be arbitrarily chosen (while equally arbitrarily discarding other disclosed features) to merely lump together disparate features of different references as a mosaic in an attempt to meet the features of the rejected claims.

Koito relates to a residue stripping composition comprising at least one alcohol having an ether bond in the molecule thereof as component (a), and an anticorrosive as component (b). The Koito composition may further include organic or inorganic weak acids as component (c), water as component (d), and amines as component (e), wherein tetramethylammonium hydroxide (TMAH) is enumerated as an amine. The Koito compositions are disclosed to comprise 0.001 to 15% by weight of component (b), 0 to 15% by weight of component (c), 2 to 70 % by weight of component (d), 1 to 40% by weight of component (e), and 30% by weight or more component (a) as the balance (see, Koito, paragraph [0035]). Notably, Koito recites:

“[h]owever, it was found that if the components to elevate stripping functions were excessively added, and the pH of the stripping composition was 6 or below, or 12 or above, a certain type of low-dielectric films were damaged.” (see, Koito, paragraph [0016]) (emphasis added)

Evidence of the poor performance as the pH approaches or exceeds pH 12 can be seen in Table 1 of Koito, recreated below for ease of discussion, which compares the residue stripping performance, the copper corrosion resistance and dielectric (SiOC-based) film damage of eleven different compositions, wherein the amine present is 2-methylaminoethanol (a weak base). When reading the results of Table 1, “A” corresponds to no observed residue, corrosion or damage; “B” corresponds to little residue, corrosion or damage; “C” corresponds to a small quantity of residue, corrosion or damage; and “D” corresponds to a large quantity of residue, corrosion or damage.

TABLE 1

Stripping agent No.	Composition (wt %)						Cu			
	a) THFA	a) DEGB	b) Adenine	d) Water	e) 2MAE	c) Lactic acid	pH	Strippability; Via bottom	corrosion resistance	Film damage; SiOC-based
1	43.0		0.030	18.5	25.0	13.5	10.0	A	C	B
2	67.0		0.030	19.0	6.0	8.0	8.6	A	A	A
3	75.0		0.030	19.0	6.0	0.0	11.0	C	C	B
4	71.0		0.030	19.0	6.0	4.0	10.0	B	B	B
5	90.0		0.030	4.0	4.0	1.0	10.3	C	A	A
6	33.0		0.030	60.0	3.0	4.0	6.6	B	B	B
7	23.0		0.030	70.0	3.0	4.0	6.2	C	C	B
8	67.0		0.001	19.0	6.0	8.0	8.6	A	C	A
9	67.0		1.000	18.0	6.0	8.0	8.5	A	A	A
10		65.0	0.030	20.5	10.0	4.5	10.0	A	A	C
11		75.5	0.030	10.5	10.0	4.0	10.0	A	A	C

THFA: Tetrahydrofurfuryl alcohol

DEGB: Diethylene glycol monobutyl ether

2MAE: 2-Methylaminoethanol

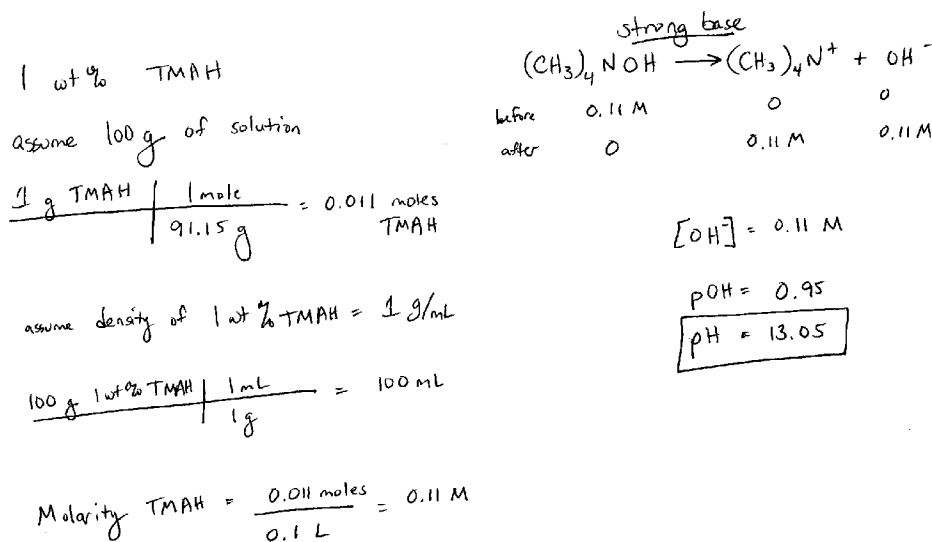
Of particular interest in Table 1 is stripping agents Nos. 2-4, containing *inter alia* 6.0 wt% 2-methylaminoethanol (2MAE), and having 8.0 wt%, 0.0 wt% and 4.0 wt% lactic acid to yield compositions having pH values of 8.6, 11.0 and 10.0, respectively. Stripping agents Nos. 2-4 evidence the worsening results with increasing pH. Further, stripping agents Nos. 2-4 evidence what can happen when the buffer of the composition (e.g., a composition including lactic acid) is limited or has been broken. When the number of moles of lactic acid exceeded the number of moles of 2MAE, the pH of the composition was about 8.6 and the stripping, corrosion and damage results are excellent (No. 2, pH 8.6). As less lactic acid was available, the pH started to increase (become more basic) and the results become less favorable (No. 4, pH 10.0) and eventually unacceptable (No. 3, pH 11.0).

According to the Examiner, Koito discloses a composition including a quaternary base and adenine. As introduced hereinabove, Koito discloses that the concentration range for amines (i.e.,

the quaternary base, component (e)) is 1 wt% to 40 wt%. The Examiner has indicated that it would be obvious to the skilled person to include potassium hydroxide, as disclosed in both En and Sato, for a reasonable expectation of sufficiently providing “additional alkalinity and stripping power.” Applicants vigorously disagree.

Initially it is noted that it one skilled in the art would not consider Koito and think that “additional alkalinity”¹ would improve the Koito composition. As shown clearly in Table 1 of Koito, the best results were obtained from compositions having pH values around 8.5 (see, e.g., No.’s 2 and 9) and the results worsened as the pH rose above 10.

Considering Koito as a whole, as the Examiner must do, the Examiner is proposing that we start with the Koito composition including tetramethylammonium hydroxide (TMAH) (which Koito teaches should be present in a range from 1 to 40 wt%) and adenine, and add the KOH pursuant to En and Sato. Assuming that the Koito composition includes 1 wt% TMAH, which is a well known strong base, the pH of the Koito composition will be about 13 (see, **Exhibit 1**), which is already higher than the pH Koito states is detrimental to the dielectric material (i.e., above pH 12).



Applicants question, why would one skilled in the art add a second strong base (i.e., KOH) to a composition that already has a pH that is detrimental to the materials on the surface? Clearly, they would **not**. In fact, Koito without the KOH from En or Sato has already been rendered

¹ Applicants also submit that the terms alkalinity and basicity are not interchangeable but arguing this fact is not necessary herein.

unsatisfactory for its intended purpose based on the Examiner's suggestion. Clearly, the combination of Koito with En or Sato will render Koito unsatisfactory for its intended purpose.

The Examiner could argue that under these circumstances that it would be obvious to lower the concentration of the TMAH in the Koito composition and then add the KOH pursuant to En or Sato. Reviewing the results in Table 1 hereinabove, the best results corresponded to a pH of about 9. To achieve a pH of 9 starting with just TMAH, the formulation would have to have a TMAH concentration of 9.1×10^{-5} wt.%. An equally small concentration of KOH would have to be added to keep the pH below 12 (and preferably below 10). The low number of moles of base are likely to be absorbed by the other components present in the Koito composition such that no hydroxide ions are available for stripping removal. This would negate the Examiner's contention that it would be obvious to include potassium hydroxide, as disclosed in both En and Sato, in Koito for a reasonable expectation of sufficiently providing "additional . . . stripping power."

The Examiner could argue that the Koito composition could be buffered, as admittedly disclosed in Koito. Applicants have used the program "Buffer Maker," as shown below to demonstrate that even if the Koito composition including TMAH was buffered, the buffer capacity at pH values in a range from 8 to 11 is so low that negligible amounts of KOH will drive the pH above 12, again rendering Koito unsatisfactory for its intended purpose.



Referring below, four different preparations of a lactic acid-TMAH buffer are shown at pH 8, 9, 10, and 11. Referring to the buffer capacity versus pH plot at the bottom, it can be seen that the

pH of the 8, 9, 10, and 11 buffers is expected to rise to approximately 11.89, 11.89, 11.90 and 11.94 after the addition of only 10 mmol/L of strong monoprotic base (e.g., KOH). For the record, 10 mmol/L of KOH is equivalent to 0.056 wt% KOH. In other words, the skilled practitioner would have to add much less than 0.056 wt% KOH to maintain the pH below 12 to not render Koito unsatisfactory for its intended purpose. Applicants question, where is the motivation, teaching or suggestion to add a negligible amount of a second strong base to the Koito composition when the Koito composition actually performs better at pH values in a range from 8 and 10 and when this pH can be readily achieved with the first strong base (TMAH)?

pH = 8.00

at temperature 25 °C

lactic acid+TMAH

C(lactic acid) = 0.05 M (total)

ionic strength = 0.05000

Prepared by

Thursday, August 27, 2008

To make 1 L of above solution mix:

50.00 mL of 1.000M lactic acid (HLactate)

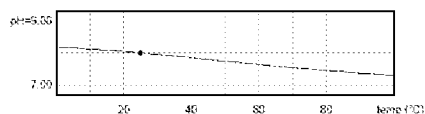
50.00 mL of 1.000M TMAH (TMAOH)

Fill up to 1 L

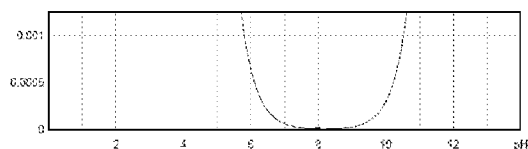
If preparing by titration @ 25 °C, titrate to pH = 8.00

Remember to check and - if necessary - adjust pH of your buffer!

Buffer pH vs temperature plot:



Buffer capacity vs pH plot.



Expected pH changes:

adding strong monoprotic acid

10 mmol/L, pH = 4.76

5 mmol/L, pH = 4.71

1 mmol/L, pH = 5.44

nominal buffer pH = 8.00

adding strong monoprotic base

1 mmol/L, pH = 10.89

5 mmol/L, pH = 11.55

10 mmol/L, pH = 11.89

pH = 9.00

at temperature 25 °C

lactic acid+TMAH

C(lactic acid) = 0.05 M (total)

ionic strength = 0.05001

Prepared by

Thursday, August 27, 2008

To make 1 L of above solution mix:

50.00 mL of 1.000M lactic acid (HLactate)

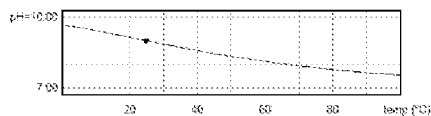
50.51 mL of 1.000M TMAH (TMAOH)

Fill up to 1 L

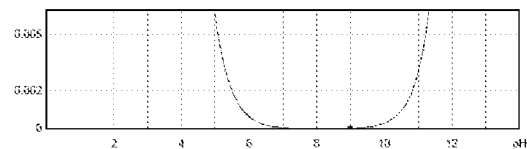
If preparing by titration @ 25 °C, titrate to pH = 9.00

Remember to check and - if necessary - adjust pH of your buffer!

Buffer pH vs temperature plot:



Buffer capacity vs pH plot:



Expected pH changes:

adding strong monoprotic acid

10 mmol/L, pH = 4.36

5 mmol/L, pH = 4.71

1 mmol/L, pH = 5.45

nominal buffer pH = 9.00

adding strong monoprotic base

1 mmol/L, pH = 10.90

5 mmol/L, pH = 11.56

10 mmol/L, pH = 11.89

pH = 10.00

at temperature 25 °C

lactic acid+TMAH

C(lactic acid) = 0.05 M (total)

ionic strength = 0.05006

Prepared by

Thursday, August 27, 2009

To make 1 L of above solution mix:

50.00 mL of 1.000M lactic acid (HLactate)

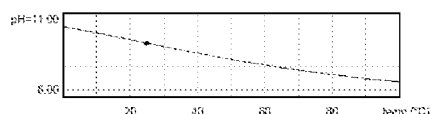
50.13 mL of 1.000M TMAH (TMAOH)

Fill up to 1 L

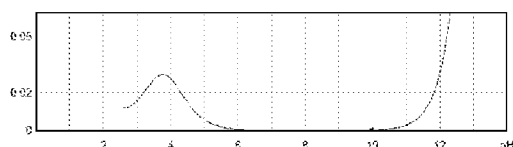
If preparing by titration @ 25 °C, titrate to pH = 10.00

Remember to check and - if necessary - adjust pH of your buffer!

Buffer pH vs temperature plot:



Buffer capacity vs pH plot:



Expected pH changes:

adding strong monoprotic acid

10 mmol/L, pH = 4.37

5 mmol/L, pH = 4.72

1 mmol/L, pH = 5.51

nominal buffer pH = 10.00

adding strong monoprotic base

1 mmol/L, pH = 10.54

5 mmol/L, pH = 11.60

10 mmol/L, pH = 11.90

pH = 11.00

at temperature 25 °C

lactic acid+TMAH

C(lactic acid) = 0.05 M (total)

ionic strength = 0.05069

Prepared by

Thursday, August 27, 2009

To make 1 L of above solution mix:

50.00 mL of 1.000M lactic acid (HLactate)

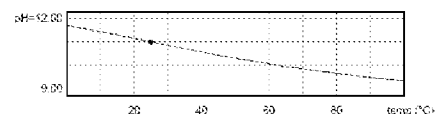
51.29 mL of 1.000M TMAH (TMAOH)

Fill up to 1 L

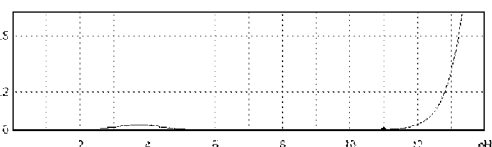
If preparing by titration @ 25 °C, titrate to pH = 11.00

Remember to check and - if necessary - adjust pH of your buffer!

Buffer pH vs temperature plot:



Buffer capacity vs pH plot:



Expected pH changes:

adding strong monoprotic acid

10 mmol/L, pH = 4.43

5 mmol/L, pH = 4.65

1 mmol/L, pH = 10.35

nominal buffer pH = 11.00

adding strong monoprotic base

1 mmol/L, pH = 11.25

5 mmol/L, pH = 11.69

10 mmol/L, pH = 11.54

Considered *in toto*, applicants claimed invention is not obvious over Koito in view of En or Sato. One skilled in the art considering Koito who opts to use the quaternary base, which is already a strong base, would not look to En or Sato and think that adding a second strong base will increase the stripping power. Instead, said skilled person would recognize that a second strong base would push the pH up to values that would render the Koito composition unsatisfactory for its intended purpose.

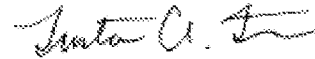
Respectfully, it appears that the Examiner, **with hindsight**, has discounted the teaching in Koito relating to pH values and dielectric material, and concluded that the current invention is obvious over Koito in view of En and Sato. This is legally impermissible.

In conclusion and in light of the above discussion, Applicants submit that the Examiner has not met its burden of establishing a *prima facie* case of obviousness. Accordingly, Applicants respectfully request that the rejection of claims 1-2, 4-5, 10, 15, 19-20 and 56 be reversed and all claims found patentable.

CONCLUSION

For the reasons presented above, the rejections of claims 1-2, 4-5, 10, 15, 19-20 and 56 under 35 USC §103(a) should be reversed, in view of the patentable character of the subject matter of applicants' claims. The Examiner's rejections have all been predicated on speculative construction of references that do not provide motivation to be so combined. Accordingly, no basis of *prima facie* obviousness of applicants' claimed invention is presented by the references variously asserted by the Examiner. The Board is correspondingly requested to reverse all of the Examiner's rejections of claims 1-2, 4-5, 10, 15, 19-20 and 56 herein appealed.

Respectfully submitted,



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Attorney for Appellant

Reg. No. 52,926

Appendices:

Claims Appendix [13 pages]

Related Proceedings Appendix [1 page]

CLAIMS APPENDIX

1. (Previously Presented) A cleaning composition comprising a quaternary base, at least one alkali or alkaline earth base, and at least one additional component selected from the group consisting of a chelator, an oxirane species, and combinations thereof, wherein said chelator comprises a species selected from the group consisting of: 1-amino-1,2,4-triazole; 1-amino-1,2,3-triazole; 1-amino-5-methyl-1,2,3-triazole; 3-mercapto-1,2,4-triazole; 3-isopropyl-1,2,4-triazole; naphthotriazole; 2-mercaptobenzimidazole; 5-aminotetrazole; 5-amino-1,3,4-thiadiazole-2-thiol; 2,4-diamino-6-methyl-1,3,5-triazine; triazine; methyltetrazole; 1,5-pentamethylenetetrazole; 1-phenyl-5-mercaptotetrazole; diaminomethyltriazine; imidazoline thione; 4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-thiol; tritoyl phosphate; indiazole; adenine; salicylamide; iminodiacetic acid; benzoguanamine; thiocyanuric acid; anthranilic acid; 3-mercaptopropanol; and combinations thereof, and wherein the oxirane species comprises a species selected from the group consisting of: oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol) (2:1), N-(3(C9-11-isoalkyloxy)propyl)derivatives, C₁₀-rich; and oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether.

2. (Original) The cleaning composition of claim 1, which is devoid of hydroxylamine therein.

3. (Cancelled)

4. (Previously Presented) The cleaning composition of claim 1, comprising the following components:

- 0.1 - 40.0 weight % organic quaternary base;
- 0.01-5 weight % alkali or alkaline earth base;
- 0-80 weight % solvent(s) and/or amine(s);
- 0-5 weight % surfactant;
- 0 – 10 weight % chelator/passivation agent; and
- 0 – 98 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

5. (Previously Presented) The cleaning composition of claim 1, including at least one additional ingredient selected from the group consisting of stabilizers, dispersants, anti-oxidants, fillers, penetration agents, adjuvants, additives, and excipients.

6. (Previously Presented) The cleaning composition of claim 1, comprising the following components:

- 2-15 weight % organic quaternary base;
- ~0.01-2 weight % alkali or alkaline earth base;
- 0-50 weight % solvent(s) and/or amine(s);
- ~0.01-2 weight % surfactant;
- 0 – 5 weight % chelator/passivation agent; and
- 40 – 95 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

7. (Previously Presented) The cleaning composition of claim 1, selected from the group consisting of Formulations A-C², wherein all percentages are by weight, based on the total weight of the formulation:

Formulation A

5.36% benzyltrimethylammonium hydroxide
0.28% potassium hydroxide
3.0% 4-methylmorpholine N-oxide
0.30% polyoxyethylene(150) dinonylphenyl ether
0.08% 2-mercaptobenzimidazole
91.0% water

Formulation B

5.36% benzyltrimethylammonium hydroxide
0.28% potassium hydroxide
3.0% 4-methylmorpholine N-oxide
0.30% polyoxyethylene(150) dinonylphenyl ether
0.20% 5-amino-1,3,4-thiadiazole-2-thiol
90.86% water

Formulation C

3.60% benzyltrimethylammonium hydroxide

0.27% potassium hydroxide
 3.5% 4-methylmorpholine N-oxide
 15.0% 4-(3-aminopropyl)morpholine
 0.30% polyoxyethylene(150) dinonylphenyl ether
 0.08% 2-mercaptobenzimidazole
 77.25% water

Formulation D

5.36% benzyltrimethylammonium hydroxide
 0.28% potassium hydroxide
 20.0% dimethyl sulfoxide
 0.08% 2-mercaptobenzimidazole
 74.28% water

Formulation E

5.36% benzyltrimethylammonium hydroxide
 0.28% potassium hydroxide
 10.0% tetramethylene sulfone
 0.30% oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol) (2:1),
 N(-3(C9-11-isoalkyloxy)propyl)derivatives, C₁₀-rich
 0.08% 2-mercaptobenzimidazole
 83.98% water

Formulation F

5.36% benzyltrimethylammonium hydroxide
 0.28% potassium hydroxide
 10.0% di(ethyleneglycol)butyl ether
 10.0% 2-(2-dimethylamino)ethoxy)ethanol
 0.30% oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol) (2:1),
 N(-3(C9-11-isoalkyloxy)propyl)derivatives, C₁₀-rich
 74.06% water

Formulation G

5.36% benzyltrimethylammonium hydroxide
 0.28% potassium hydroxide
 10.0% tetramethylene sulfone
 10.0% di(ethyleneglycol)butyl ether
 0.10% oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether
 0.08% 2-mercaptobenzimidazole
 74.18% water,

Formulation H

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %

2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	59.02 %

Formulation I

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	15.0 %
water	64.02 %

Formulation J

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	10.0 %
water	69.02 %

Formulation K

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.62 %

Formulation L

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.02 %

Formulation M

tetramethylammonium hydroxide, 25% aqueous solution	5.85 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.57 %

Formulation N

tetramethylammonium hydroxide, 25% aqueous solution	2.93 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.49 %

Formulation O

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	84.82 %

Formulation P

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	87.82 %

Formulation Q

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.42 %

Formulation R

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
KOH, 45% aqueous solution	0.3 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.12 %

Formulation S

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %

3-amino-5-mercapto-1,2,4-triazole	1.0 %
water	72.04 %

Formulation T

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
4-methyl-2-phenyl-imidazole	1.0 %
water	72.04 %

Formulation U

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
2-mercaptothiazoline	1.0 %
water	72.04 %

Formulation V

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
8-hydroxyquinoline	1.0 %
water	72.04 %

Formulation W

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
1-phenyl-2-tetrazoline-5-thione	1.0 %
water	72.04 %

Formulation X

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
gallic acid	1.0 %
water	72.04 %

Formulation Y

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
salicylic acid	1.0 %
water	72.04 %

Formulation Z

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
ascorbic acid	1.0 %
water	72.04 %

Formulation A²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.12 %

Formulation B²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	0.5 %
water	81.62 %

Formulation C²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.02 %
dinonylphenol polyoxyethylene	0.1 %

8. (Cancelled)

9. (Cancelled)

10. (Previously Presented) The cleaning composition of claim 1, wherein the alkali base comprises potassium hydroxide.

11.-13. (Cancelled)

14. (Previously Presented) The cleaning composition of claim 1, wherein the chelator comprises 2-mercaptobenzimidazole.

15. (Previously Presented) The cleaning composition of claim 1, wherein the chelator is present in an amount greater than about 0.08 wt.%, based on the total weight of the composition.

16. (Cancelled)

17. (Previously Presented) The composition of claim 1, further comprising a surfactant.

18. (Original) The composition of claim 17, wherein the surfactant comprises a surfactant species selected from the group consisting of: fluoroalkyl surfactants; polyethylene glycols; polypropylene glycols; polyethylene glycol ethers; polypropylene glycol ethers; carboxylic acid salts; dodecylbenzenesulfonic acid and salts thereof; polyacrylate polymers; dinonylphenyl polyoxyethylene; silicone polymers; modified silicone polymers; acetylenic diols; modified acetylenic diols, alkylammonium salts; modified alkylammonium salts; and combinations of two or more of the foregoing.

19. (Previously Presented) The composition of claim 1, further comprising a co-solvent.

20. (Original) The composition of claim 19, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: amines; glycols; glycol ethers; polyglycol ethers; and combinations of two or more of the foregoing.

21. (Original) The composition of claim 19, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: dimethyldiglycolamine; 1,8-diazabicyclo[5.4.0]undecene; aminopropylmorpholine; triethanolamine; methylethanolamine; diethylene glycol; propylene glycol; neopentyl glycol; hydroxyethylmorpholine;

aminopropylmorpholine; di(ethylene glycol)monoethyl ether; di(propylene glycol)propyl ether; ethylene glycol phenyl ether; di(propylene glycol) butyl ether; butyl carbitol; polyglycol ethers; and combinations of two or more of the foregoing.

22. (Cancelled)

23. (Cancelled)

24. (Withdrawn) A method of removing photoresist and/or SARC material from a substrate having said material thereon, said method comprising contacting the substrate with a cleaning composition for sufficient time to at least partially remove said material from the substrate, wherein the cleaning composition comprises a quaternary base, at least one alkali or alkaline earth base, and at least one additional component selected from the group consisting of a chelator, an oxirane species, and combinations thereof, wherein said chelator comprises a species selected from the group consisting of: 1-amino-1,2,4-triazole; 1-amino-1,2,3-triazole; 1-amino-5-methyl-1,2,3-triazole; 3-mercapto-1,2,4-triazole; 3-isopropyl-1,2,4-triazole; naphthotriazole; 2-mercaptobenzimidazole; 5-aminotetrazole; 5-amino-1,3,4-thiadiazole-2-thiol; 2,4-diamino-6-methyl-1,3,5-triazine; triazine; methyltetrazole; 1,5-pentamethylenetetrazole; 1-phenyl-5-mercaptotetrazole; diaminomethyltriazine; imidazoline thione; 4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-thiol; tritoyl phosphate; indiazole; adenine; salicylamide; iminodiacetic acid; benzoguanamine; thiocyanuric acid; anthranilic acid; 3-mercaptopropanol; and combinations thereof, and wherein the oxirane species comprises a species selected from the group consisting of: oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol) (2:1), N-(3(C9-11-isoalkyloxy)propyl)derivatives, C₁₀-rich; and oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether.

25. (Withdrawn) The method of claim 24, wherein the substrate comprises a semiconductor device structure.

26. (Withdrawn) The method of claim 24, wherein the material comprises photoresist.

27. (Withdrawn) The method of claim 24, wherein the material comprises SARC material.

28. (Withdrawn) The method of claim 27, wherein the SARC material has been applied to a

semiconductor device structure to minimize reflectivity variations during photolithographic patterning on the semiconductor device structure.

29. (Withdrawn) The method of claim 24, wherein said contacting is carried out for a time of from about 10 to about 45 minutes.

30. (Withdrawn) The method of claim 24, wherein said contacting is carried out at temperature in a range of from about 50°C to about 80°C.

31. (Withdrawn) The method of claim 24, wherein the composition is devoid of hydroxylamine therein.

32. (Cancelled)

33. (Withdrawn) The method of claim 24, wherein the composition comprises the following components:

- 0.1 - 40.0 weight % organic quaternary base;
- 0.01-5 weight % alkali or alkaline earth base;
- 0-80 weight % solvent(s) and/or amine(s);
- 0-5 weight % surfactant;
- 0 – 10 weight % chelator/passivation agent; and
- 0 – 98 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

34. (Withdrawn) The method of claim 24, wherein the composition includes at least one additional ingredient selected from the group consisting of stabilizers, dispersants, anti-oxidants, fillers, penetration agents, adjuvants, additives, fillers, and excipients.

35. (Withdrawn) The method of claim 24, wherein the composition comprises the following components:

- 2-15 weight % organic quaternary base;
- ~0.01-2 weight % alkali or alkaline earth base;

0-50 weight % solvent(s) and/or amine(s);
~0.01-2 weight % surfactant;
0 – 5 weight % chelator/passivation agent; and
40 – 95 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

36. (Cancelled).

37. (Cancelled)

38. (Cancelled)

39. (Withdrawn) The method of claim 24, wherein the alkali base comprises potassium hydroxide.

40.-42. (Cancelled)

43. (Withdrawn) The method of claim 24, wherein the chelator comprises 2-mercaptobenzimidazole.

44. (Withdrawn) The method of claim 43, wherein the chelator is present in an amount greater than about 0.08 wt.%, based on the total weight of the composition.

45. (Withdrawn) The method of claim 24, wherein the quaternary base comprises benzyltrimethylammonium hydroxide.

46. (Withdrawn) The method of claim 24, wherein the cleaning composition further comprises a surfactant.

47. (Withdrawn) The method of claim 46, wherein the surfactant comprises a surfactant species selected from the group consisting of: fluoroalkyl surfactants; polyethylene glycols; polypropylene glycols; polyethylene glycol ethers; polypropylene glycol ethers; carboxylic acid

salts; dodecylbenzenesulfonic acid and salts thereof; polyacrylate polymers; dinonylphenyl polyoxyethylene; silicone polymers; modified silicone polymers; acetylenic diols; modified acetylenic diols, alkylammonium salts; modified alkylammonium salts; and combinations of two or more of the foregoing.

48. (Withdrawn) The method of claim 24, wherein the cleaning composition further comprises a co-solvent.

49. (Withdrawn) The method of claim 48, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: amines; glycols; glycol ethers; polyglycol ethers; and combinations of two or more of the foregoing.

50. (Withdrawn) The method of claim 48, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: dimethyldiglycolamine; 1,8-diazabicyclo[5.4.0]undecene; aminopropylmorpholine; triethanolamine; methylethanolamine; diethylene glycol; propylene glycol; neopentyl glycol; hydroxyethylmorpholine; aminopropylmorpholine; di(ethylene glycol)monoethyl ether; di(propylene glycol)propyl ether; ethylene glycol phenyl ether; di(propylene glycol) butyl ether; butyl carbitol; polyglycol ethers; and combinations of two or more of the foregoing.

51. (Cancelled)

52. (Cancelled)

53. (Previously Presented) The cleaning composition of claim 1, wherein the quaternary base comprises an organic quaternary ammonium base.

54. (Previously Presented) The cleaning composition of claim 1, wherein the quaternary base comprises benzyltrimethylammonium hydroxide.

55. (Previously Presented) The cleaning composition of claim 1, wherein the cleaning composition comprises benzyltrimethylammonium hydroxide and potassium hydroxide.

56. (Previously Presented) The cleaning composition of claim 19, wherein the co-solvent comprises a glycol ether.

57. (Previously Presented) The cleaning composition of claim 1 comprising benzyltrimethylammonium hydroxide; potassium hydroxide; tetramethylene sulfone; di(ethyleneglycol)butyl ether; oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether; 2-mercaptobenzimidazole; and water.

58. (Withdrawn) A method of making a semiconductor device comprising contacting the substrate with the cleaning composition of claim 1 for sufficient time to at least partially remove said material from the substrate.

59. (Previously Presented) The cleaning composition of claim 1, further comprising oxidant.

RELATED PROCEEDINGS APPENDIX

There exist no other prior or pending appeals, interference or judicial proceedings known to appellant, appellant's attorney, or the assignee which may be related to, direct affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. Accordingly, there exists no decisions rendered by a court of the Board in any related proceedings, such that no related proceedings are identified in this Related Proceedings Appendix.